

Revised classification of the family Aphelinidae (Hymenoptera : Chalcidoidea)¹

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(With forty-nine text-figures)

A brief historical review of the family Aphelinidae is given. The new generic characters of pronotum, subgenital plate and female external genitalia have been studied in thirteen genera of the family Aphelinidae. These characters together with the generic characters proposed by earlier workers have made the identification of genera more clear and perfect. A revised key to Indian genera of the family Aphelinidae is also given.

INTRODUCTION

Thomson (1876) proposed the tribe Aphelinina for the genus *Aphelinus* Dalman. Howard (1881) raised the tribe Aphelinina to subfamily rank Aphelininae of the family Chalcididae and placed the genera *Aphelinus* Dalman and *Coccophagus* Westwood in it. Ashmead (1904) considered Aphelininae as subfamily of Eulophidae and divided it into two tribes, Aphelinini and Pteroptericini, mainly based on number of tarsal segments. Later, this system of classifying the Aphelinids into tribes was followed by Howard (1907) and Mercet (1912). Girault (1915) considered Aphelininae as a subfamily of Encyrtidae. Viereck (1916) raised the subfamily Aphelininae to family rank,

Aphelinidae. Mercet (1930) added the subfamily Calesinae, thereby placing three subfamilies (Aphelininae, Pteroptericinae and Calesinae) within the family Aphelinidae. De Santis (1948) divided the family Aphelinidae into three subfamilies, Aphelininae, Cocco-phaginae and Calesinae, principally based on the number of tarsal segments and presence or absence of speculum. Further, he dropped the subfamily Pteroptericinae from the family Aphelinidae.

Ghesquiere (1955) proposed a new subfamily Eriaporinae in the family Aphelinidae for the genus *Eriaporus* Waterston. Later, Subba Rao (1969) synonymised *Eriaporus* Waterston with *Promuscidea* Girault and shifted it to the family Pteromalidae. Alam (1956) emphasized for the first time the generic importance of the characters of pronotum, subgenital plate and genitalia. These characters later have been upheld by Agarwal (1966), Hayat (1971) and

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Shafee (1973). In this respect his work may be taken as a basis for future researches.

Erdős (1964) divided the family Aphelinidae into three subfamilies, Aphelininae, Pteroptericinæ and Eriaporinæ. Ferrière (1965) added Coccophaginiæ as the fourth subfamily to Aphelinidae. Nikol'skaya and Yasnosh (1966) divided the family Aphelinidae into five subfamilies, Aphelininae, Calesinæ, Cocco-phaginiæ, Prospaltellinæ and Azotinæ. Further, they dropped the subfamily Pteroptericinæ from Aphelinidae and distributed its genera among other families. They exclude the subfamily Eriaporinæ from Aphelinidae.

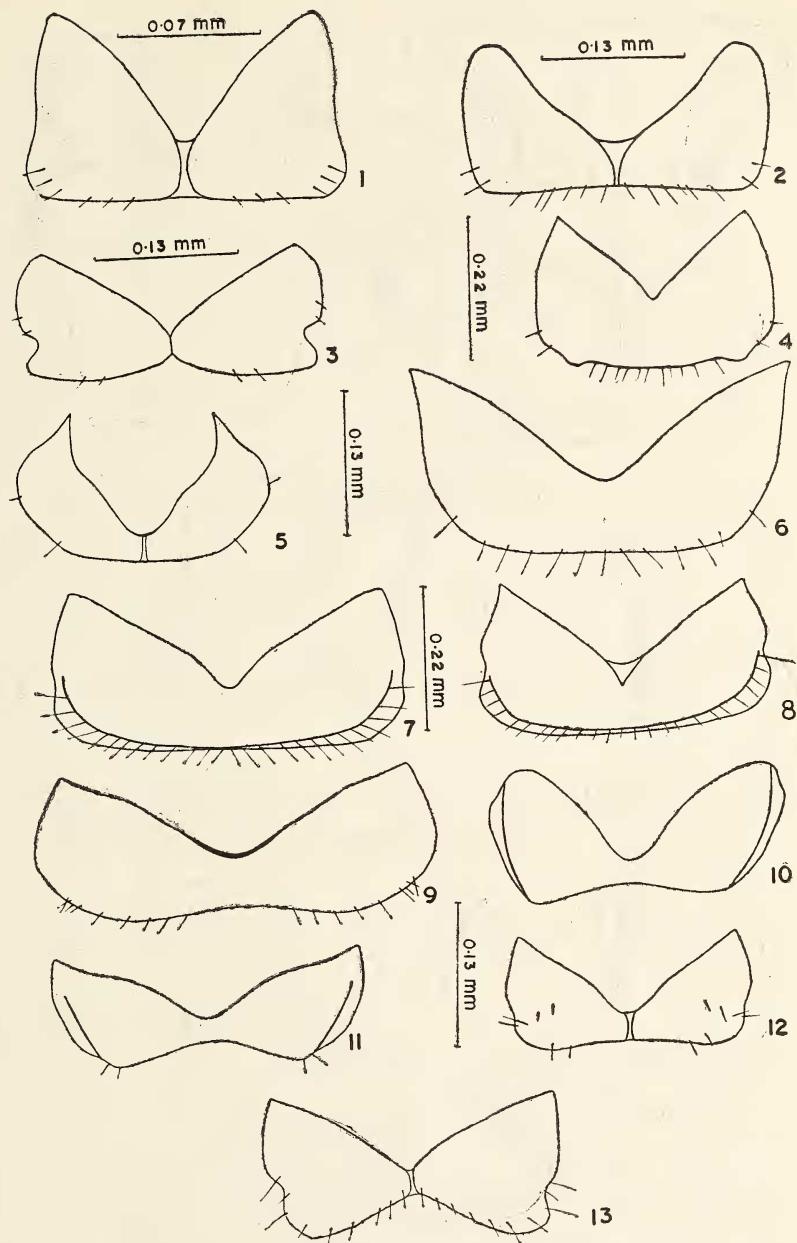
A key to Indian genera of the family Aphelinidae is proposed, mainly based on pronotum, subgenital plate, first valvifers, second valvifers and outer plates. Further, the already existing characters as far as possible, have been used as supporting characters for the genera.

**REVISED KEY TO THE INDIAN GENERA
OF THE FAMILY APHELINIDAE**

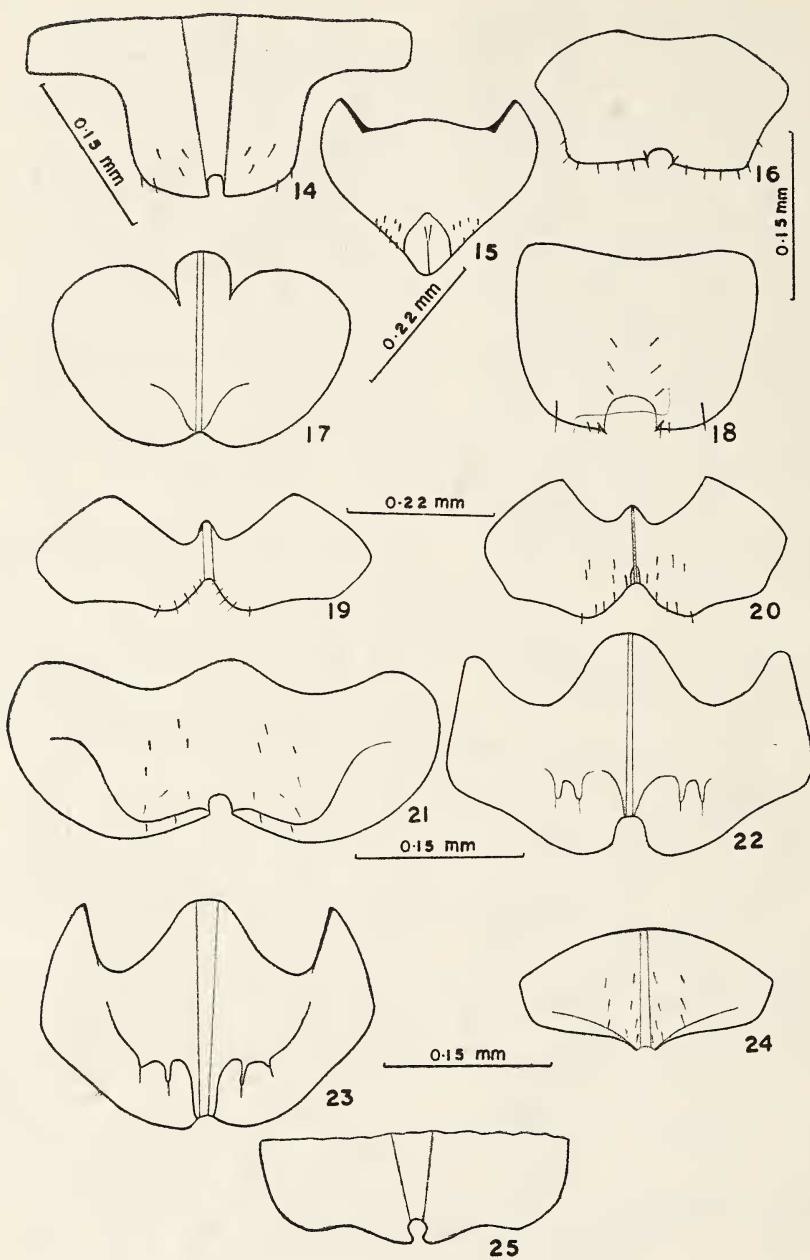
1. Tarsi 4-jointed 2
 - Tarsi 5-jointed 3
 2. Antennæ 5-segmented ; club long, entire ; pronotum formed of two separate sclerotic pieces (fig. 1 ; Hayat, 1972b, fig. 7) ; first valvifers triangular with basal and apical angles at different levels (fig. 38) ; second valvifers of uniform width (fig. 26) ; third valvulae of moderate length and movably articulated with second valvifers (fig. 26) ; posterior margin of subgenital plate semi-circular with a notch in middle (fig. 14)... *Eretmocerus* Haldeman
 - Antennæ 7-segmented ; club short, 3-segmented ; pronotum formed of one continuous sclerotic plate, narrow in middle (Alam 1956, fig. 37) ; first valvifers triangular with base slightly curved (Alam 1956) ; third valvulae immovably articulated with second valvifers (Alam 1956)..... *Casca* Howard
 3. Fore wings with speculum..... 4
 - Fore wings without speculum..... 10
 4. Antennæ 5 to 7-segmented..... 5
 - Antennæ 4-segmented ; funicle and club each 1-segmented ; pronotum formed of two separate
- sclerotic pieces (Hayat 1974b) ; marginal vein longer than submarginal vein ; post-marginal vein absent *Marlattiella* Howard
 5. Antennæ 6 or 7-segmented..... 6
 - Antennæ 5-segmented ; fore wings hyaline with an obscure patch below stigmal vein and a group of conspicuous setae on middle of mesal margin of speculum ; mesonotum with 4 longitudinal black bands ; abdominal dorsum with 5 black transverse bands. *Syediella* Shafee
 6. Antennæ 6-segmented ; club entire ; marginal vein well-developed ; stigmal vein short..... 7
 - Antennæ 7-segmented ; club 2-segmented ; pronotum formed of one sclerotic plate, anterior margin deeply concave, posterior margin straight (fig. 6 ; Hayat 1972c, fig. 2) ; marginal vein distinctly shorter than submarginal vein ; stigmal vein well-developed ; first valvifers almost triangular (fig. 42 ; Hayat 1972c, fig. 4) ; second valvifers of uniform width with dorsal marginal ridge ; third valvulae movably articulated with second valvifers (fig. 30 ; Hayat 1972c, fig. 4) ; subgenital plate with anterior margin straight, posterior margin with semi-circular notch in middle (fig. 18 ; Hayat 1972c, fig. 3)... *Eriaphytis* Hayat
 7. Pronotum formed of two separate sclerotic pieces (figs. 2, 3, 5 ; Nikol'skaya & Yasnosh 1966, figs. 151, 172 ; Hayat 1972a, fig. 9 ; Hayat 1973, fig. 3) ; fore wings generally without hyaline spots or bands of transparent setae and body without pronounced white spots or maculations..... 8
 - Pronotum formed of one continuous sclerotic plate (fig. 4 ; Nikol'skaya & Yasnosh 1966, fig. 164 ; Agarwal 1964b, fig. 28) ; fore wings with hyaline spots or bands of transparent setae, or body with pronounced white spots or maculations, most frequently with both ; first valvifers almost semi-circular (fig. 41 ; Agarwal 1964b, fig. 30) ; subgenital plate with a mid-longitudinal groove (fig. 17) *Marietta* Motschulsky
 8. Last sternite (subgenital plate) reaches to middle of abdomen ; ovipositor uncovered and straight ; general body colour yellow ; subgenital plate with broadly truncated posterior margin and without anterolateral apodemes (fig. 16) ; parasites of eggs and Coccids 9
 - Last sternite (subgenital plate) reaches to apex of abdomen covering the ovipositor except apex which is curved upward ; general body colour black ; subgenital plate V-shaped with greatly reduced posterior margin, anterolateral apodemes distinct (fig. 15) ; first valvifers triangular (fig. 39) ; parasites of aphids..... *Aphelinus* Dalman

9. Body generally elongate ; wings narrow ; legs long and slender ; ovipositor generally more or less prominent ; parasites of eggs.....
— *Centrodora* Foerster
- Body short; wings broad ; ovipositor not or little prominent ; parasites of Coccids.....
— *Aphytis* Howard
10. Pronotum formed of one continuous sclerotic plate (figs. 7-11 ; Alam 1956, figs. 10, 31 ; Agarwal 1964b, fig. 17 ; Hayat 1971, fig. 8 ; Hayat 1974b, fig. 12) ; first valvifers of varying shapes (figs. 43-47 ; Alam 1956, figs. 12a, 35a ; Agarwal 1964b, fig. 21)..... 11
- Pronotum formed of two separate sclerotic pieces (figs. 12, 13 ; Alam 1956, fig. 2 ; Agarwal 1964a, fig. 25 ; Nikol'skaya & Yasnosh 1966, fig. 456 ; Hayat 1974a, fig. 2) ; first valvifers triangula with basal and apical angles at different levels (figs 48, 49 ; Alam 1956, fig. 6b ; Agarwal 1964a fig. 29) 15
11. Antennae 8-segmented ; club 3-segmented ; posterior margin of pronotum straight with submarginal ridge (figs. 7, 8 ; Alam 1956, fig. 10 ; Hayat 1971, fig. 8) ; first valvifers triangular with basal and apical angles at different levels (figs 43, 44 ; Alam 1956, fig. 12a ; Zinna 1961, Pl. 7 fig. 2 ; Nikol'skaya & Yasnosh 1966, fig. 20) . second valvifers of uniform width, third valvulae, short (figs. 31, 32 ; Zinna 1961, Pl. 7, fig. 2, Nikol's kaya & Yasnosh 1966, fig. 20) ; subgenita plate narrow, anterior margin connected with posterior margin by a mid longitudinal groove, central notch of posterior margin without laterally directed ridges (figs. 19, 20)..... 12
- Antennae 7-segmented ; club 1 or 2-segmented ; posterior margin of pronotum concave and without submarginal ridge (figs. 9-11 ; Alam 1956, fig. 31 ; Agarwal 1964b, fig. 17 ; Hayat 1974b, fig. 12) ; first valvifers quadrate or semi-circular ; second valvifers and third valvulae usually long and narrow (figs. 33-35) ; subgenital plate moderately broad, central notch of posterior margin with laterally directed ridges (figs. 21-23)..... 13
12. Funicle segments cylindrical ; postmarginal vein usually well-developed.... *Coccophagus* Westwood
- Funicle segments flattened ; post marginal vein usually absent ; base of mid tibiae with rows of bristles..... *Aneristus* Howard
13. Funicle 4-segmented ; club entire ; pronotum with a submarginal ridge along each lateral margin (figs. 10, 11 ; Alam 1956, fig. 31 ; Agarwal 1964b, fig. 17 ; Hayat 1974b, fig. 12) ; first valvifers semi-circular, with basal and apical angles in one plane (figs. 46, 47 ; Alam 1956, fig. 35a ; Zinna 1962, Pl. 35, fig. 3) ; second valvifers and third valvulae long and narrow (figs. 34, 35 ; Zinna 1962, Pl. 35, fig. 2 ; Agarwal 1964b, fig. 22) ; subgenital plate broad, anterior margin connected with posterior margin by a midlongitudinal groove (figs. 22, 23)..... 14
- Funicle 3-segmented ; club 2-segmented ; pronotum without submarginal ridge along each lateral margin (fig. 9) ; first valvifers quadrate with basal and apical angles at different levels (fig. 45) ; second valvifers uniformly broad with mid longitudinal ridge ; third valvulae short (fig. 33) ; subgenital plate transverse and without mid longitudinal groove (fig. 21) *Physeus* Howard
14. Fore wings with group of long black setae ; stigmal vein swollen ; subgenital plate without anterolateral apodemes (fig. 22 ; Agarwal 1964b, fig. 19) *Azotus* Howard
- Fore wings not so patterned ; stigmal vein long, slender ; subgenital plate with anterolateral apodemes (fig. 23 ; Hayat 1974b, fig. 15)
— *Ablerus* Howard
15. Fore wings broad with usually short marginal fringe, with setae at radius 16
- Fore wings narrow with long marginal fringe, bare at radius ; outer plates of ovipositor narrow in proximal region, gradually broadening distally with distal end narrowly rounded, dorsal margin followed by a long narrow submarginal ridge (Alam 1956, fig. 6a)..... *Aspidiotiphagus* Howard
16. Funicle and club each 3-segmented..... 17
- Funicle and club 4-and 2-segmented respectively ; posterior margin of subgenital plate with a notch in middle (fig. 25) *Trichaporus* Foerster
17. Antennal club not distinctly separated from funicle ; club conical at apex ; marginal vein shorter than submarginal vein (Hayat 1974a, fig. 2)..... *Coccophagooides* Girault
- Antennal club distinctly separated from funicle ; club blunt at apex ; marginal vein longer than submarginal vein *Prospaltella* Ashmead

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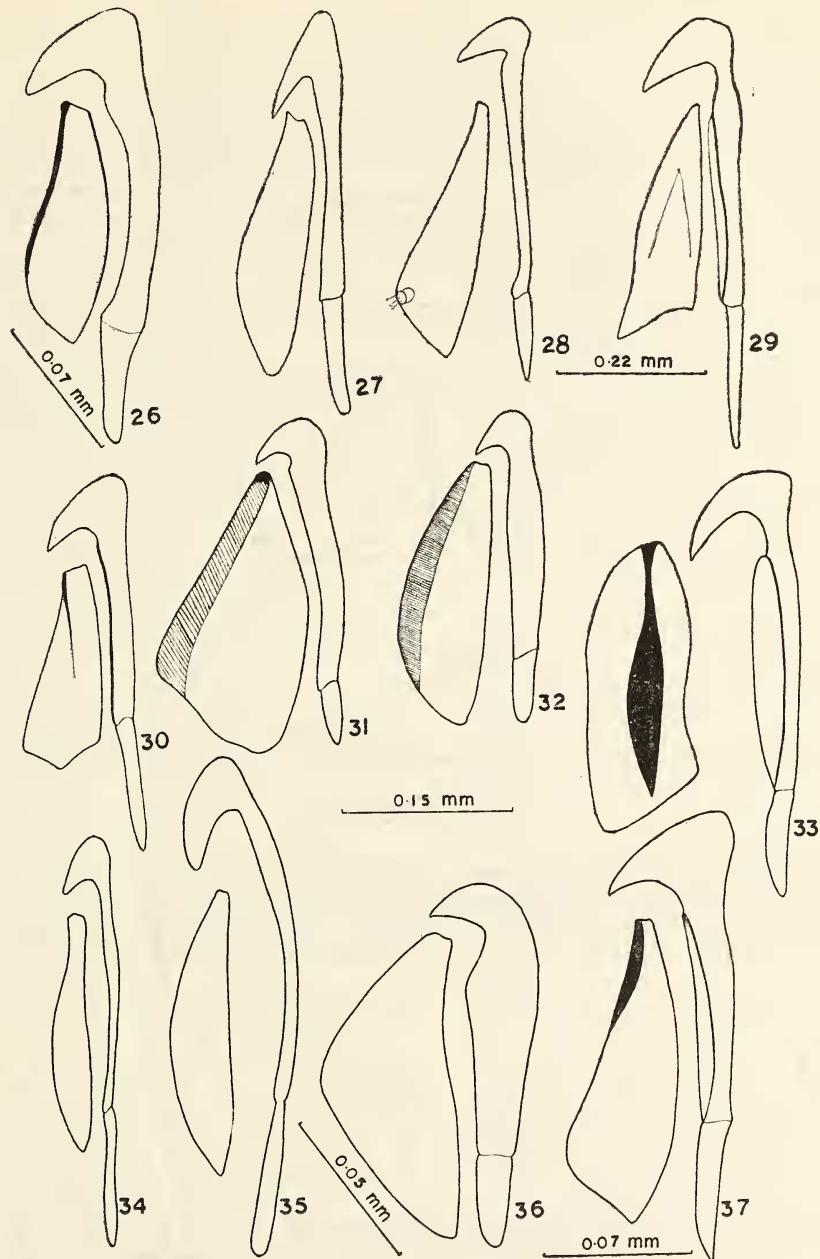


Figs. 1-13. Female pronotum : (1) *Eretmocerus haldemanii* Howard ; (2) *Aphelinus mali* (Haldeman) ; (3) *Aphytis alami* Agarwal; (4) *Marietta orientalis* (Howard); (5) *Centrodora azizi* Hayat; (6) *Eriaphytis orientalis* Hayat ; (7) *Coccophagus shafeei* Hayat ; (8) *Aneristus ceroplastae* Howard ; (9) *Physcus albipodus* Agarwal ; (10) *Azotus qadrii* Agarwal ; (11) *Ablerus aonidiellae* Hayat ; (12) *Prospaltella flava* Shafee ; (13) *Trichaporus partenopeus* (Masi).

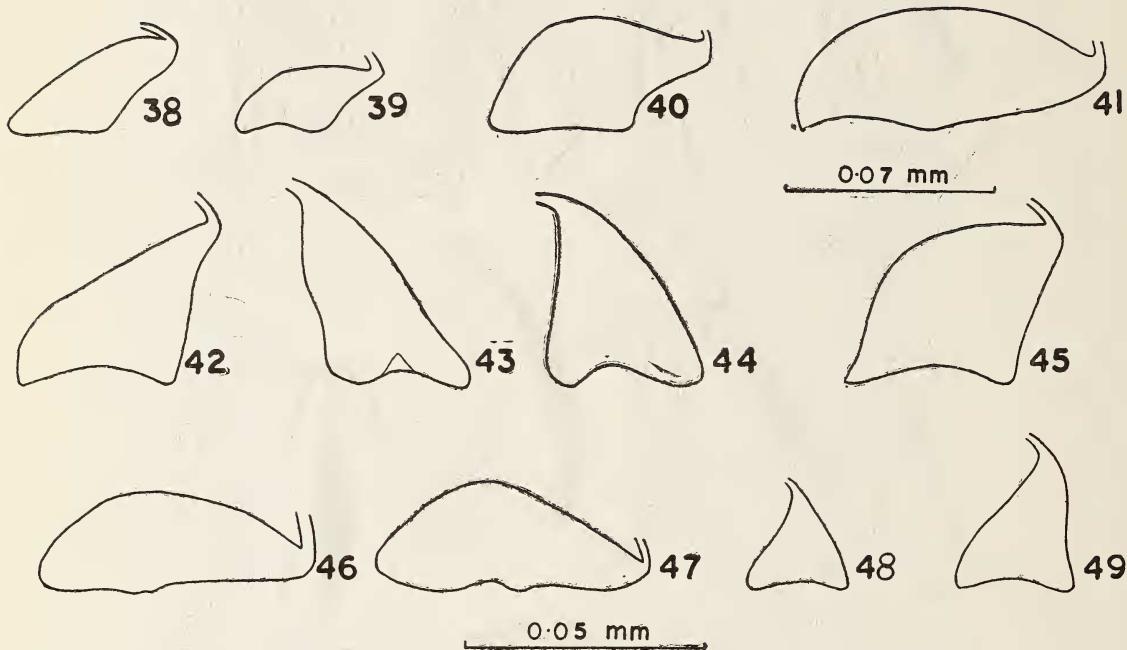


Figs. 14-25. Female subgenital plate : (14) *Eremocerus haldemani* Howard ; (15) *Aphelinus mali* (Haldeman) ; (16) *Aphytis alami* Agarwal ; (17) *Marietta orientalis* (Howard) ; (18) *Eriaphytis orientalis* Hayat ; (19) *Cocco-phagus shafeei* Hayat ; (20) *Aneristus ceroplatae* Howard ; (21) *Physcus albipodus* Agarwal ; (22) *Azotus qadrii* Agarwal ; (23) *Ablerus aonidiellae* Hayat ; (24) *Prospaltella flava* Shafee ; (25) *Trichaporus partenopeus* (Masi).

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Figs. 26-37. Part of female external genitalia : (26) *Eretmocerus haldemani* Howard ; (27) *Aphelinus mali* (Haldeman) ; (28) *Aphytis alami* Agarwal ; (29) *Marietta orientalis* (Howard) ; (30) *Eriaphytis orientalis* Hayat ; (31) *Coccophagus shafeei* Hayat ; (32) *Aneristus ceroplastae* Howard ; (33) *Physcus albipodus* Agarwal ; (34) *Azotus qadrii* Agarwal ; (35) *Ablerus aonidiellae* Hayat ; (36) *Prospaltella flava* Shafee ; (37) *Trichaporus partenopeus* (Masi).



Figs. 38-49. First valvifer : (38) *Eretmocerus haldemani* Howard ; (39) *Aphelinus mali* (Haldeman) ; (40) *Aphytis alami* Agarwal ; (41) *Marietta orientalis* (Howard) ; (42) *Eriaphytis orientalis* Hayat ; (43) *Coccophagus shafeei* Hayat ; (44) *Aneristus ceroplastae* Howard ; (45) *Physcus albipodus* Agarwal ; (46) *Azotus qadrii* Agarwal ; (47) *Ablerus aonidiellae* Hayat ; (48) *Prospaltella flava* Shafee ; (49) *Trichaporus partenopeus* (Masi).

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